

# TOSHIBA

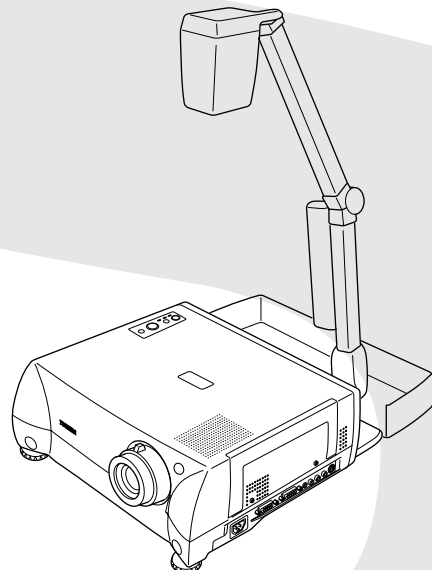
FILE NO. 330-9706

## SERVICE MANUAL

# 3LCD DATA PROJECTOR

## ***TLP510U, TLP511U***

## ***TLP510E, TLP511E***



**TLP511U**

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# SECTION 1

## PART REPLACEMENT AND ADJUSTMENT PROCEDURES

### 1. LOCATION OF MAIN PARTS

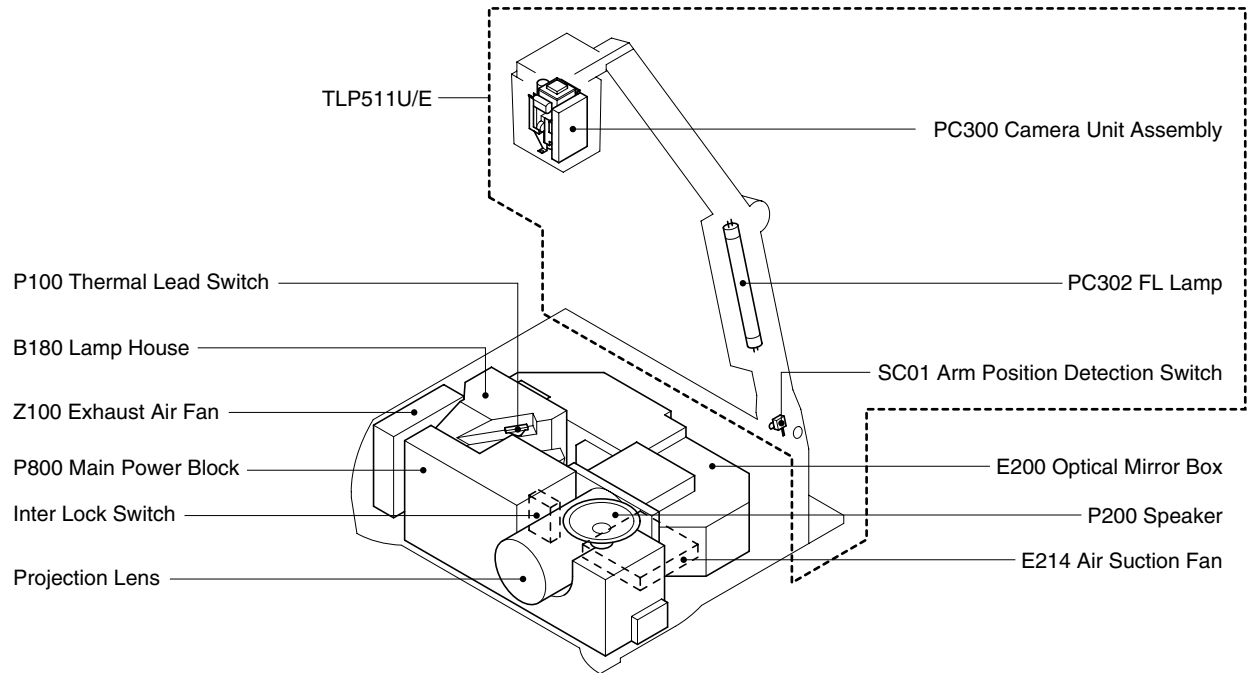


Fig. 1-0-1

### 2. LOCATION OF PC BOARDS

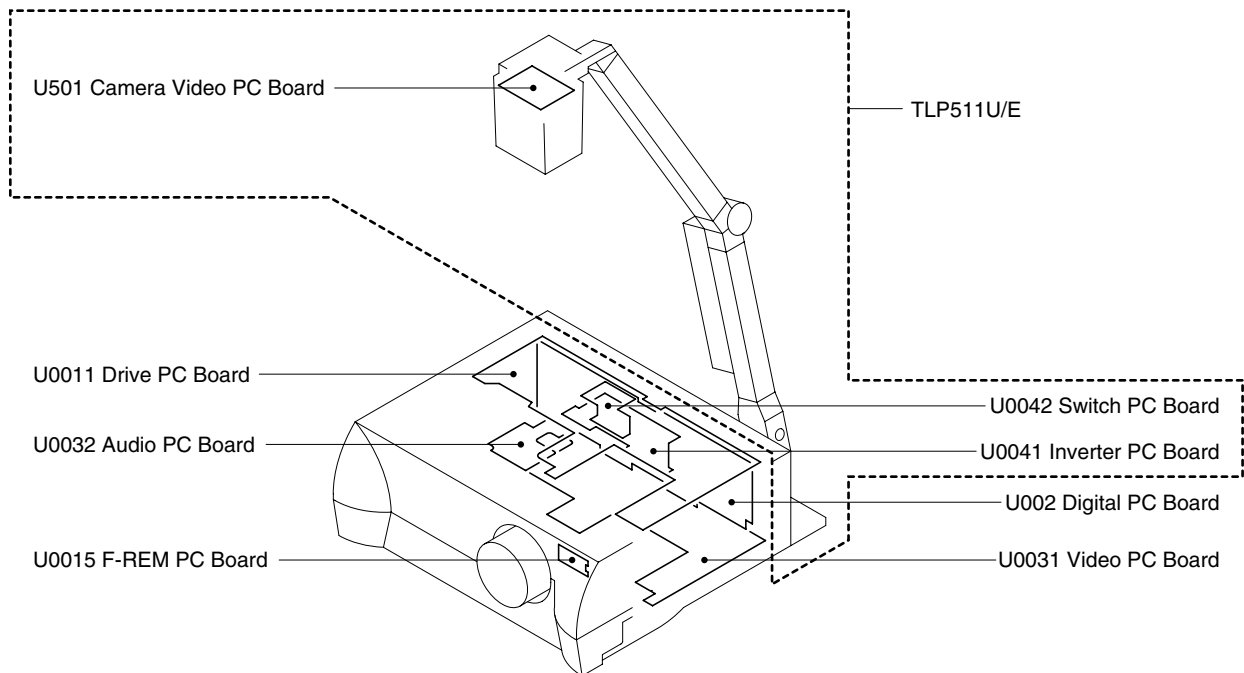


Fig. 2-0-1

## CAUTIONS BEFORE STARTING SERVICING

Electronic parts are susceptible to static electricity and may easily be damaged, so do not forget to take a proper grounding treatment as required.

Many screws are used inside the unit. To prevent missing, dropping, etc. of the screws, always use a magnetized screwdriver in servicing. Several kinds of screws are used and some of them need special cautions. That is, take care of the tapping screws securing molded parts and fine pitch screws used to secure metal parts. If they are used improperly, the screw holes will be easily damaged and the parts can not be fixed.

### 3. DISASSEMBLING

#### 3-1. Main Unit (1)

##### 3-1-1. Document Camera (TLP511U/E)

1. Remove 4 screws (1) and remove document camera rear plate.
2. Disconnect 1 connector (2) connected to the document camera.
3. Remove 5 screws (3) and remove the document camera.

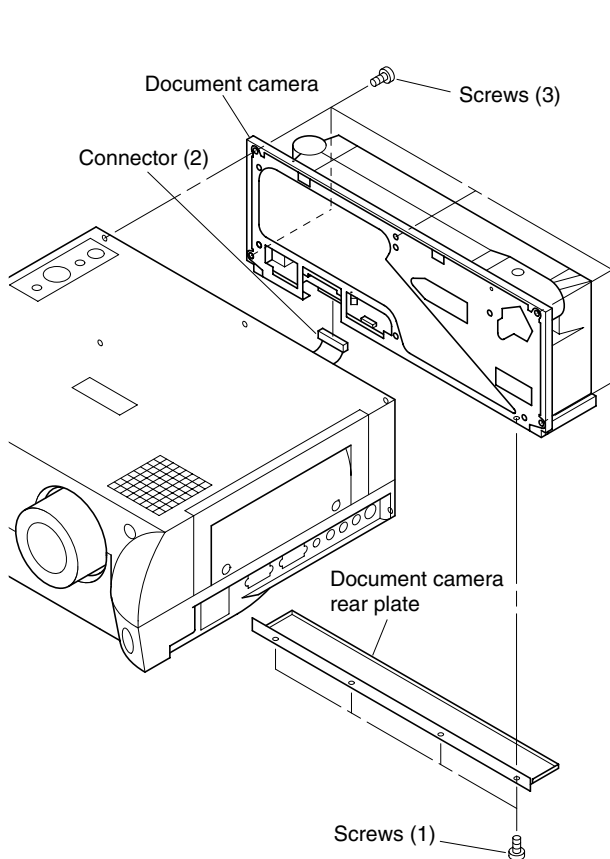


Fig. 3-1-1

##### 3-1-2. Top Cover and Speaker

1. Remove document camera. (TLP511U/E: Refer to Fig. 3-1-1.)
2. Remove top tag and remove 1 screw (1).
3. Remove 6 screws (2) and lift up top cover while pressing section A of the top cover.
4. Remove speaker connector (3) and remove top cover.
5. Remove 2 screws (4) securing speaker holder, and remove speaker from speaker holder.

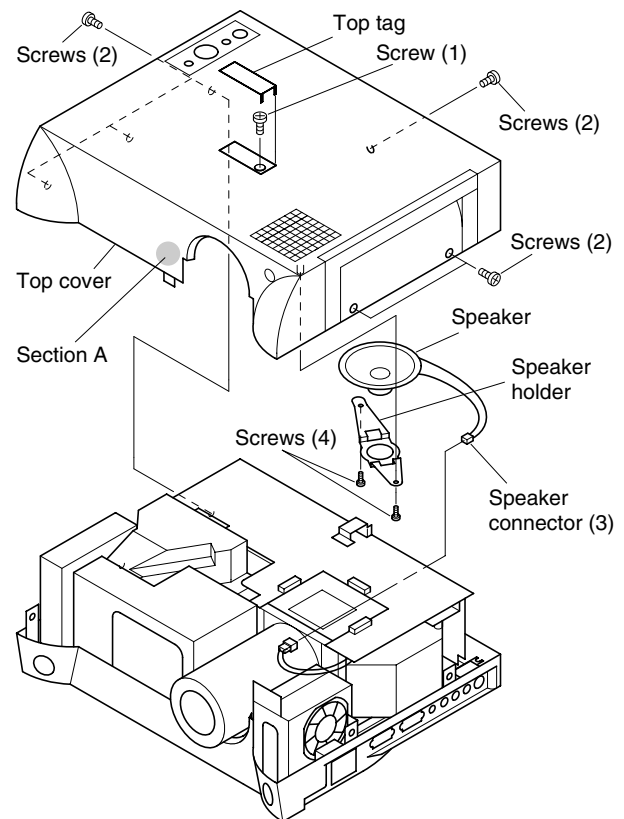


Fig. 3-1-2

### 3-1-3. Drive PC Board and F-REM PC Board

1. Remove 1 screw (1) and remove reinforcement metal plate.
2. Remove 6 screws (2) securing drive PC board.
3. Remove 3 flexible cables (3) from LCD panel and 2 flexible cables (4) from the rear side.
4. Disconnect 8 connectors (5) from drive PC board.
5. Confirm all the connector are disconnected and then lift up the drive PC board.
6. Remove 1 screw (6).
7. Remove 1 connector (7) and remove F-REM PC Board.

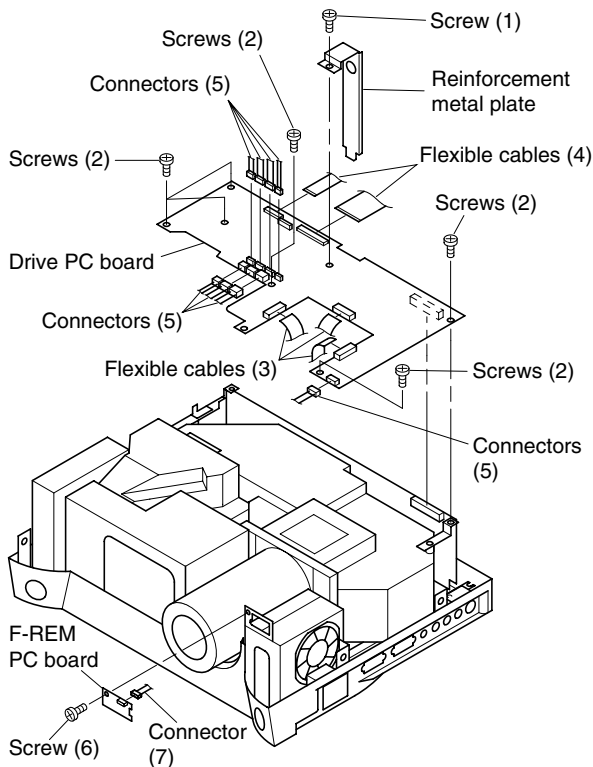


Fig. 3-1-3

### 3-1-4. Digital PC Board

1. Remove drive PC board. (Refer to Fig. 3-1-3.)
2. Remove 1 connector (1).
3. Lift up digital PC board.

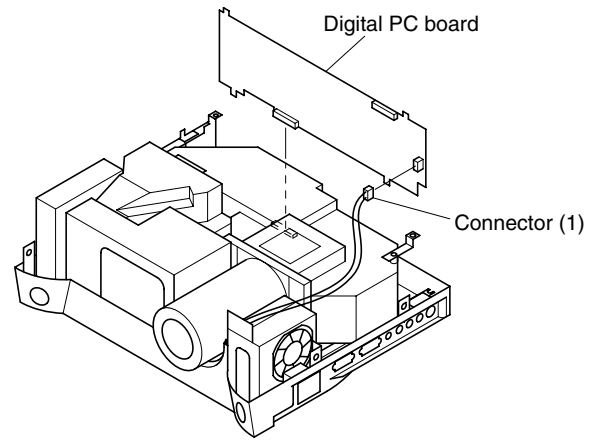


Fig. 3-1-4

### 3-1-5. Lamp House Assembly and Exhaust Fan

#### Note:

- Remove the lamp unit in advance. (Refer to Owner's Manual.)
1. Remove 2 connectors (1).
  2. Remove 2 screws (2) and disconnect socket.
  3. Remove 3 screws (3) and remove lamp house assembly.
  4. Remove 2 screws (4) and remove exhaust fan.
  5. Remove 1 screw (5) and remove exhaust fan mounting frame.

#### < When removing the exhaust fan >

Make sure the top cover is removed. Remove 2 screws (4) and disconnect connector of fan lead, and the fan will be removed.

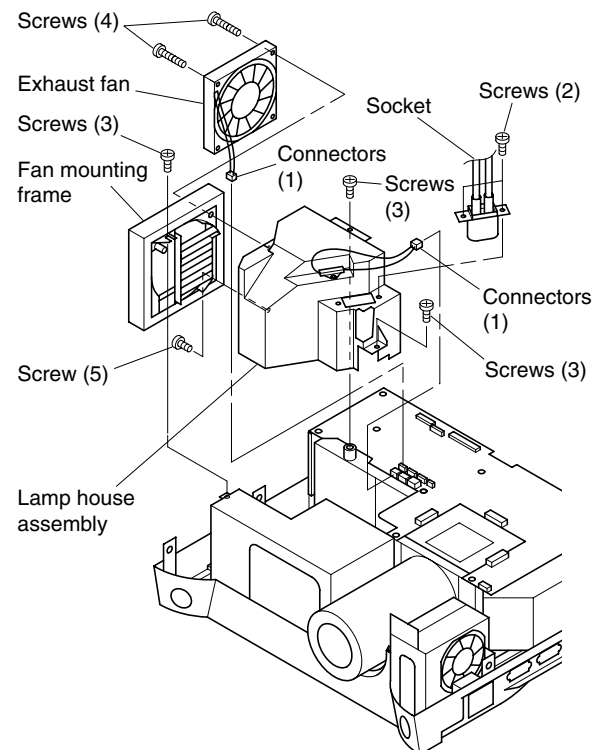


Fig. 3-1-5

### 3-1-6. Optical Box and Air Suction Fan

1. Remove drive PC Board. (Refer to Fig. 3-1-3.)
2. Remove lamp house assembly. (Refer to Fig. 3-1-5.)
3. Remove 2 screws (1) and remove PC board holder bracket.
4. Remove 3 screws (2) and remove metal fitting.
5. Remove 4 screws (3) and remove optical box lifting upward.
6. Remove 2 screws (4) and remove air suction fan.

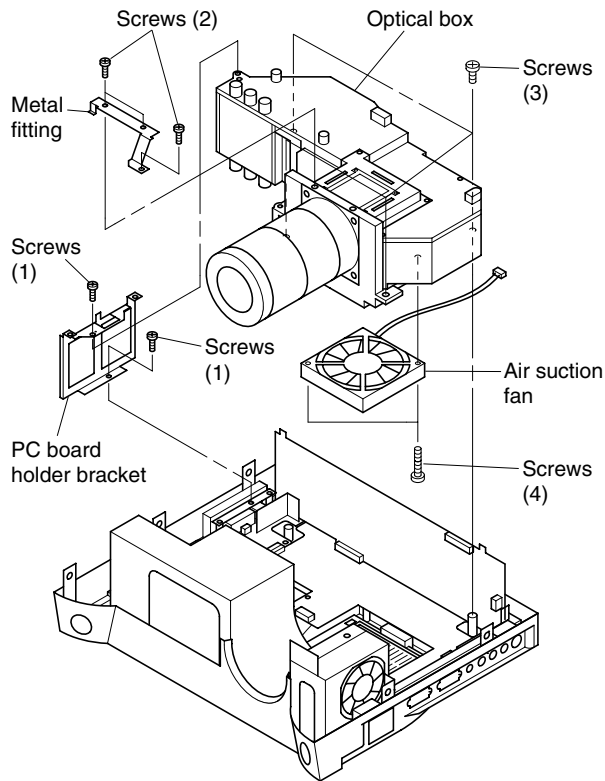


Fig. 3-1-6

### 3-1-7. Main Power Supply Block

1. Remove drive PC board. (Refer to Fig. 3-1-3.)
2. Remove lamp house assembly. (Refer to Fig. 3-1-5.)
3. Remove optical box. (Refer to Fig. 3-1-6.)
4. Remove 1 connector (1).
5. Remove 4 screws (2) and remove main power supply block.

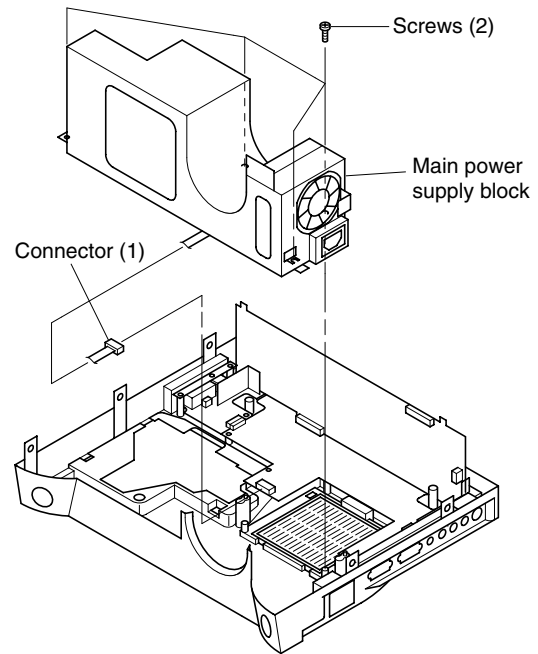


Fig. 3-1-7

### 3-1-8. Video PC Board and Audio PC Board

1. Remove drive PC board. (Refer to Fig. 3-1-3.)
2. Remove lamp house assembly. (Refer to Fig. 3-1-5.)
3. Remove optical box. (Refer to Fig. 3-1-6.)
4. Disconnect joint of Video PC board and audio PC board.
5. Remove 1 connector (1) of Video PC board.
6. Remove 8 screws (2) and remove Video PC board.
7. Remove 3 screws (3) and remove audio PC board.

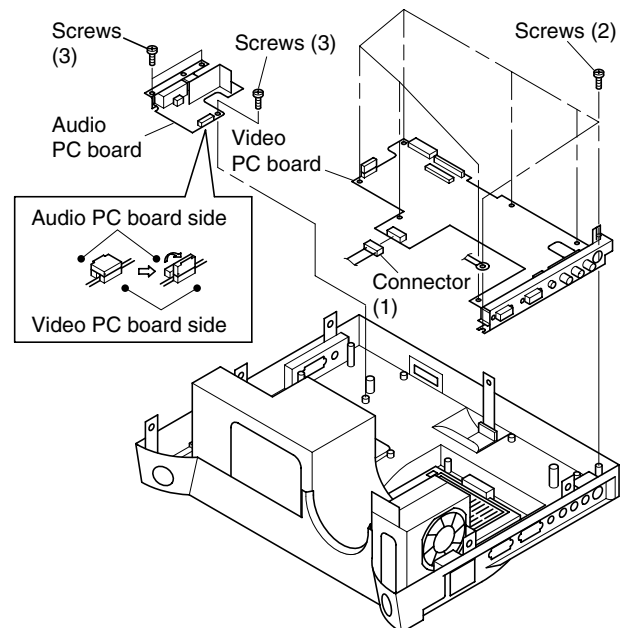


Fig. 3-1-8

## 3-2. Main Unit (2) – Optical Box

### 3-2-1. Lens

1. Remove optical box. (Refer to Fig. 3-1-6.)
2. Remove 4 screws (1) and remove lens.

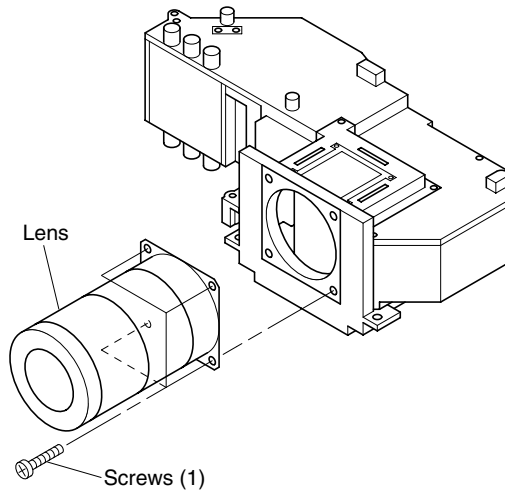


Fig. 3-2-1

### 3-2-2. Filter Cover and Mirror Block Cover

1. Remove optical box. (Refer to Fig. 3-1-6.)
2. Peel off tape covering openings around FPC section of each color LCD on the filter cover.
3. Remove 4 screws (1) and remove filter cover.
4. Remove 6 screws (2) and remove mirror block cover.

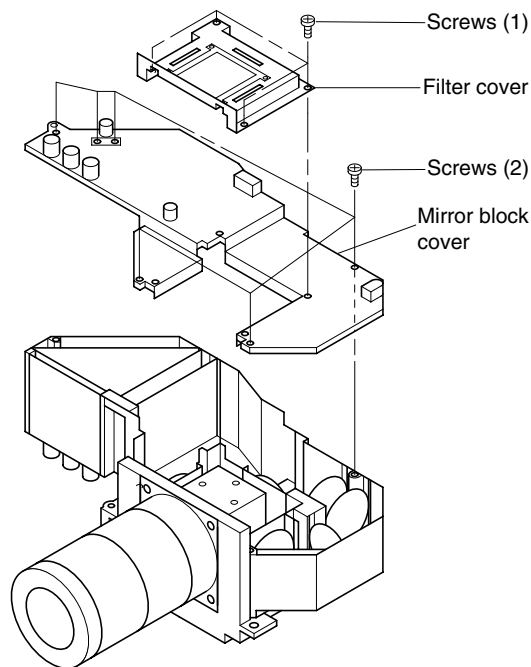


Fig. 3-2-2

### 3-2-3. LCD Block, LCD Plate and LCD Panel

#### Note:

- Do not touch the LCD panels with your bare fingers. Wear white cotton gloves when working with the panels.
1. Remove all cables connected to connectors on PC board and LCD panel and drive PC board.
  2. Peel off tape covering openings around FPC section of each LCD on filter cover.
  3. Remove 4 screws (1) and remove filter cover.
  4. Remove 3 screws (2) (always use a screw driver with a strong magnet) and remove LCD plate with LCD to be replaced from LCD block. When replacing three LCDs at the same time, first remove green LCD plate from the LCD block.
  5. Remove 3 screws (3) and remove LCD panel from LCD plate.

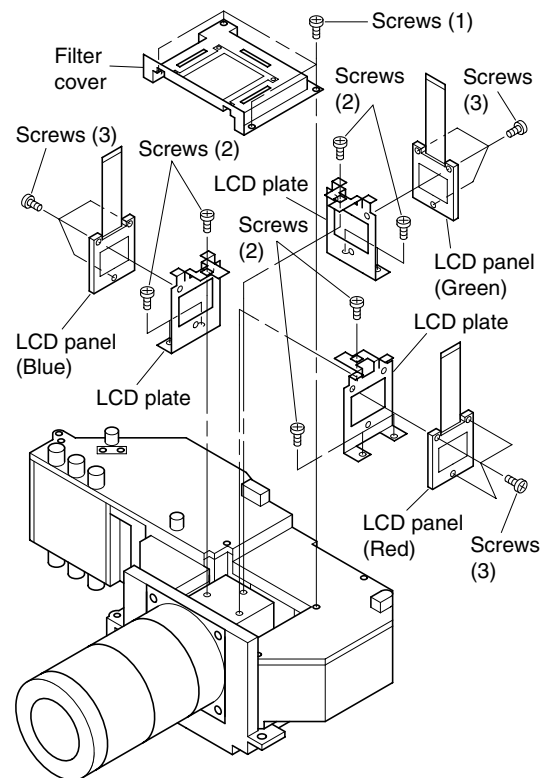


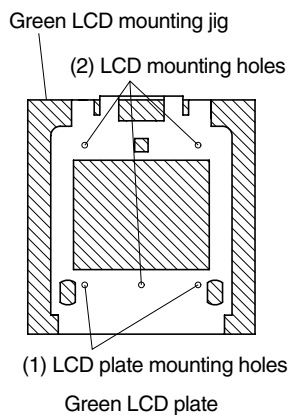
Fig. 3-2-3

### < How to mount a new LCD >

1. When mounting a red LCD, mount it on the red LCD plate (No.23796019) or when mounting a blue LCD, mount it on the blue LCD plate (No.23796018) so that the FPC section faces upward and main unit side faces downward.
2. When mounting a green LCD, mount it on the LCD plate used so far. In this case, prepare the green LCD mounting jig (No.23796021), and position the LCD plate so that its two holes (1) matches two protruded parts on the jig. Then place the green LCD on it in the same direction as the red and blue LCDs by tightening screws (3 holes (2) on the LCD plate).

#### Note:

- Be always sure to attach the black shielding sheet on the LCD.



**Fig. 3-2-4**

3. Mount the LCD plate with a new LCD mounted at the bottom side of the LCD block (can be mounted only in one direction) and tighten the screws. Do not tighten the screws completely. Tighten the screws temporarily so that the LCD can move for later pixel matching adjustment of the LCDs.

#### Note:

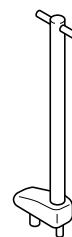
- Do not mount the filter cover to allow the LCD adjustment.

### < Adjustment of LCD >

If the red and blue LCD panels need to be adjusted, follow the procedures in the item "Red/Blue LCD adjustment". However, if the green LCD panel needs to be adjusted, follow the procedures in the item "Green LCD adjustment". After the green LCD panel adjustment is carried out, it is necessary to replace or adjust the red and blue LCD panels as described in the item "Red/Blue LCD adjustment".

### < Service jig >

- Focus adjust jig : 23974761



**Fig. 3-2-5**

### < Drive PC board remounting >

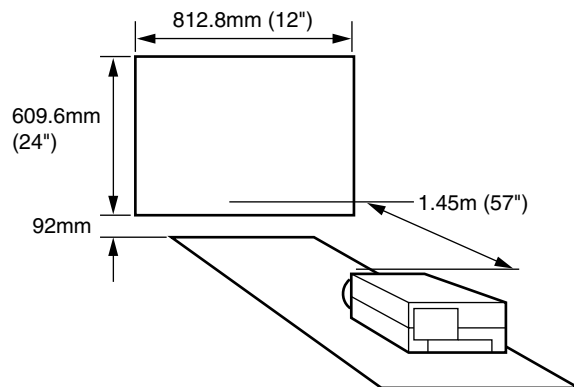
Remount the drive PC board under the filter cover not installed. Connect cables removed from connectors on the drive PC board and the LCD panel as they were connected. (If a signal generator which can not generate a white raster signal is not available, do not connect the LCD panel.)

### < Setup >

1. Make a wall chart on white fiber board as illustrated in Fig. 3-2-6.

#### Note:

- Only use a stiff material to prevent focus errors.



**Fig. 3-2-6**

2. Retract the foot adjusters so the unit sits flat.
3. Place the LCD Projector on a table so that the front edge of the lens is 1.45m from the wall. (Refer to Fig. 3-2-6)
4. Set the zoom ring to the maximum wide setting.
5. Adjust the focus ring to the center of its range.



6. Feed a white raster signal through RGB connectors and turn on the power of the projector. (If a signal generator which provides a white raster signal is not available, turn on the power without connecting the LCD panel.)
7. If all three LCD panels need to be replaced, refer to the "Green LCD adjustment".
8. Adjust the focus ring and the raster focus of the LCD which has not been replaced. If the green LCD is not replaced, adjust the green raster. If the green LCD is replaced, adjust the red raster, and if the red LCD is replaced, adjust the blue raster.
9. Attach the wall chart to the wall so the bottom line of the square lines up with the bottom of the raster. Also, center the chart horizontally with the raster.
10. Adjust the zoom ring and make sure the bottom of the raster remains on the bottom line. Return the zoom ring to the maximum wide setting.
11. Hereafter, do not move the setting position and the focus ring.

#### < Red/Blue LCD adjustment >

1. Confirm connection of the LCD panel (if not connected, connect the LCD to the connector of the PC board.)
2. Turn the projector on.
3. Input the cross hatch pattern from RGB connectors. Only input R signal when adjusting the red panel focus, and only input B signal when adjusting the blue panel focus.
4. Prepare two focus adjustment jigs. Insert them onto two holes on bottom of the LCD plate, and adjust the LCD plate back and forth until the best focus is obtained in considering left and right balance of the projection screen.

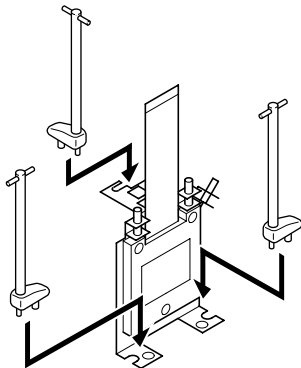


Fig. 3-2-7

5. If the focus or raster geometry is changed, when tightening the screws holding the LCD mount, loosen the screws slightly and readjust.
6. Prepare one focus adjustment jig and insert it onto the one hole on top of the LCD plate, and adjust the LCD plate back and forth until the best focus is obtained in considering upper and lower balance of the projection screen. (Refer to Fig. 3-2-7.)
7. If the focus or raster geometry is changed, when tightening the screws holding the LCD mount, loosen the screws slightly and readjust.
8. Input the cross hatch pattern of G signal.
9. Adjust the cross hatch pattern up & down (Refer to Fig. 3-2-8) and left & right (Refer to Fig. 3-2-9) with the three adjusting screws (hex screw driver (1.0 mm) available on the market) until it is aligned with the green cross hatch pattern.

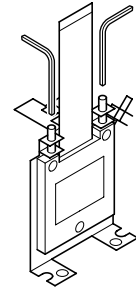


Fig. 3-2-8

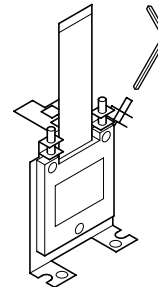


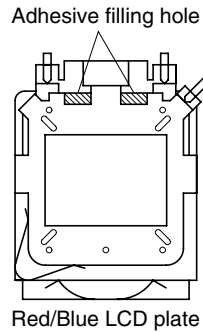
Fig. 3-2-9

10. Turn off the power, and remove the FPC section of the LCD from the connector of the drive PC board.

11. Fill a quick dry adhesive at joint of the LCD mount. In this case, sufficient care will be necessary so that the adhesive does not stick to the LCD panel surface or any other parts.

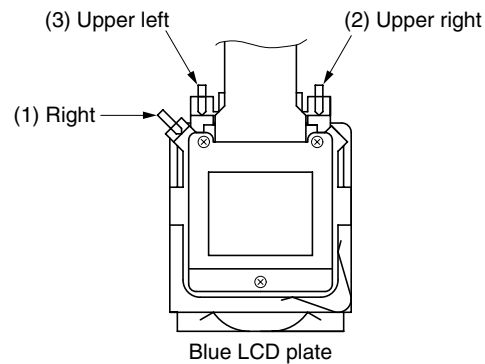
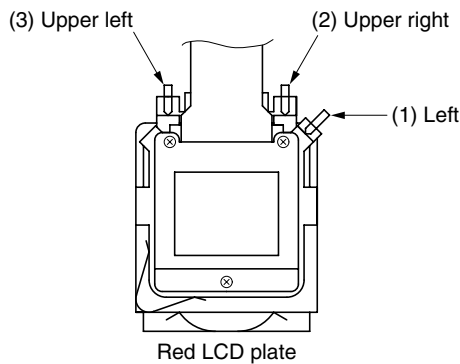
**Note:**

- Use the adhesive available on the market as an epoxy type two liquid mixture of equal amount.

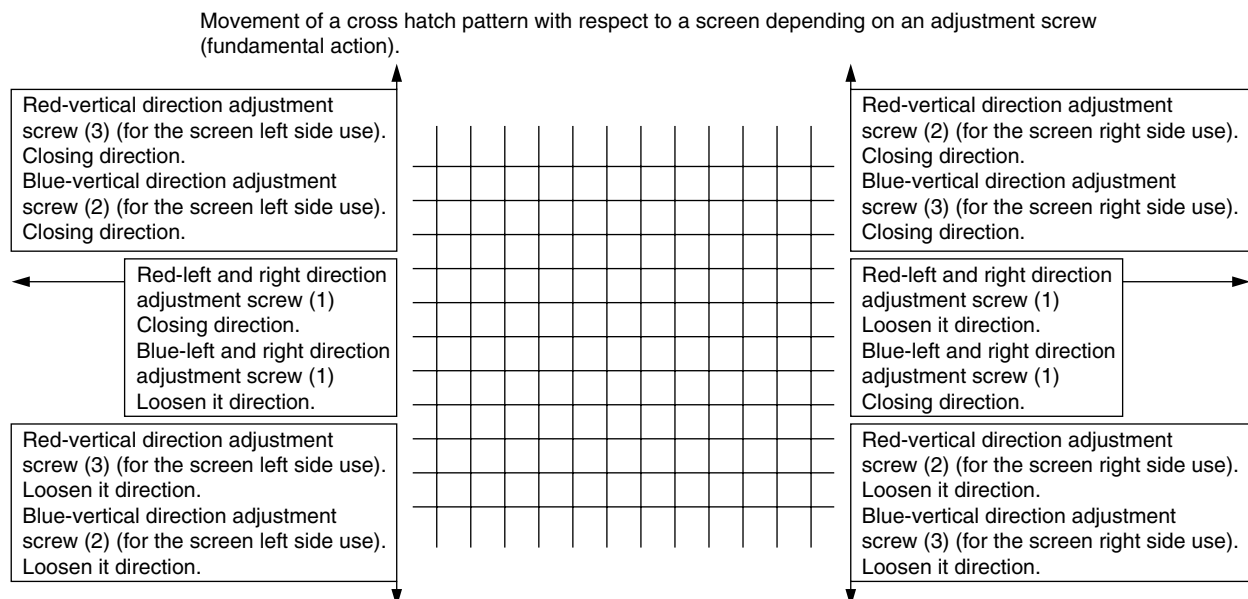


**Fig. 3-2-10**

12. Leave the LCD block until the adhesive is hardened for a required time. In this case, place a thin paper on the LCD block to prevent dusts from entering.
13. When the adhesive is hardened, connect the FPC of the LCD to the connector of the PC board, and turn on the power. Check to see pixel deviation of the LCD.
14. Check to see dusts of the LCD. If dusts are found, remove them.
15. Turn the power off. Remove all the cables connected to the PC board and LCD panel, and remove the drive PC board.
16. Mount the filter cover removed again. Tighten 4 screws, and close openings around the FPC section with tape.
17. Mount the drive PC board again. Connect cables disconnected from the drive PC board and the LCD panel as they were connected.
18. Turn on the power and check operations.



**Fig. 3-2-11**



**Fig. 3-2-12**

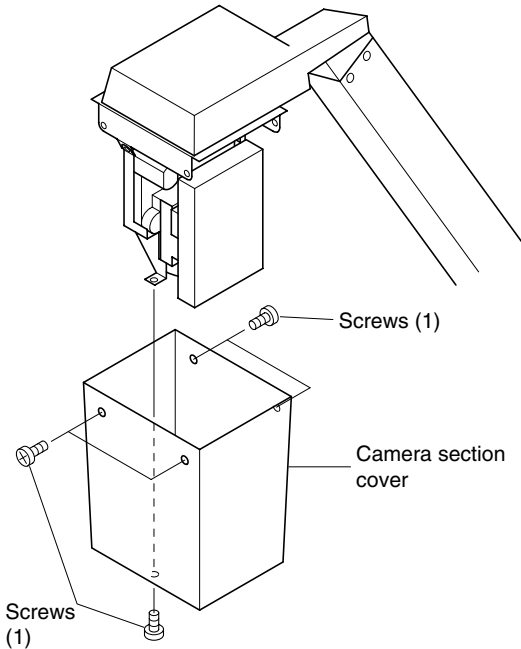
### < Green LCD adjustment >

1. Confirm connection of the LCD panel (if not connected, connect the LCD to the connector of the PC board.)
2. Turn the projector on.
3. Input the cross hatch pattern from the RGB connectors. Adjust the green color only.
4. Prepare two focus adjustment jigs. Insert them onto two holes on bottom of the LCD plate, and adjust the LCD plate back and forth until the best focus is obtained in considering left and right balance of the projection screen. (Refer to Fig.3-2-7.)
5. If the focus or raster geometry is changed, when tightening the screws holding the LCD mount, loosen the screws slightly and readjust.
6. Prepare one focus adjustment jig and insert it onto the upper hole of the LCD plate, and adjust the LCD plate back and forth until the best focus is obtained in considering upper and lower balance of the projection screen. (Refer to Fig.3-2-7.)
7. If the focus or raster geometry is changed, when tightening the screws holding the LCD mount, loosen the screws slightly and readjust.
8. When the green LCD is replaced, the pixel matching adjustments for the red and blue panels will be necessary in many cases. (If the pixel matching is obtained in above adjustment, it is not necessary.) Accordingly, turn off the power. Remove the FPC section of the red and blue LCDs from the PC board connectors, and remove the red and blue LCD plate from the LCD block.
9. Remove the red and blue LCD from the LCD plate and mount them on new LCD plates.
10. Mount the new red and blue LCD plates on the LCD block.
11. Perform the adjustment steps (1) – (9) described under “Red/Blue LCD Adjustment” for each red and blue LCD.
12. After completion of the red and blue LCD adjustments, perform the steps (10) – (18) described under “Red/Blue LCD Adjustment”.

### 3-3. Document Camera Section (TLP511U/E)

#### 3-3-1. Camera Section Cover

1. Remove 5 screws (1) and remove camera section cover.



**Fig. 3-3-1**

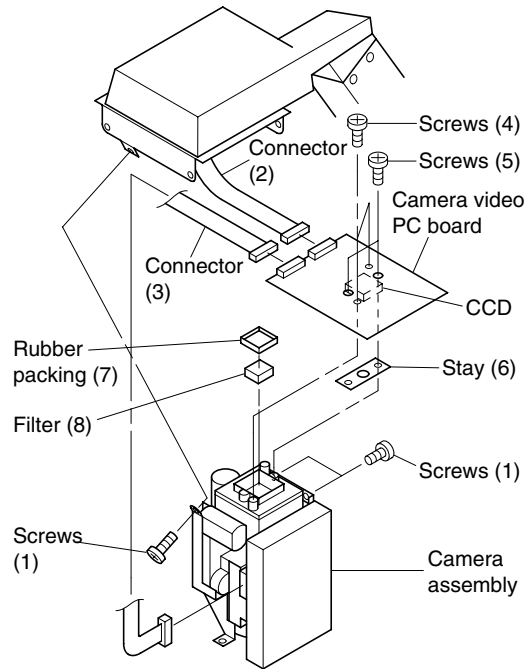
#### 3-3-2. Camera Video PC Board and Camera Assembly

1. Remove camera section cover. (Refer to Fig. 3-3-1.)
2. Remove 3 screws (1). (Refer to Fig. 3-3-2.)
3. Remove 1 connector (2) and remove camera assembly.
4. Remove 1 connector (3).
5. Remove 2 screws (4) and 2 screws (5), and camera assembly can be removed from camera video PC board.

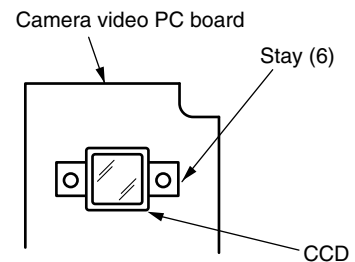
**Note:**

- When 2 screws (4) are removed, stay (6) positioned under CCD can also be removed, so care will be necessary. (Refer to Fig. 3-3-3.)

6. Remove rubber packing (7) and filter (8) from camera assembly.



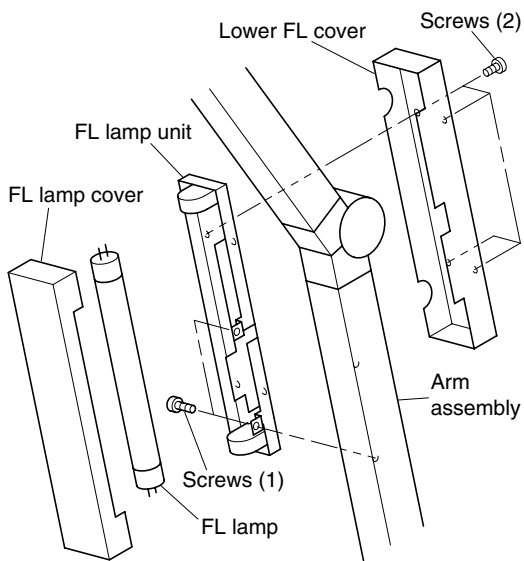
**Fig. 3-3-2**



**Fig. 3-3-3**

#### 3-3-3. FL lamp

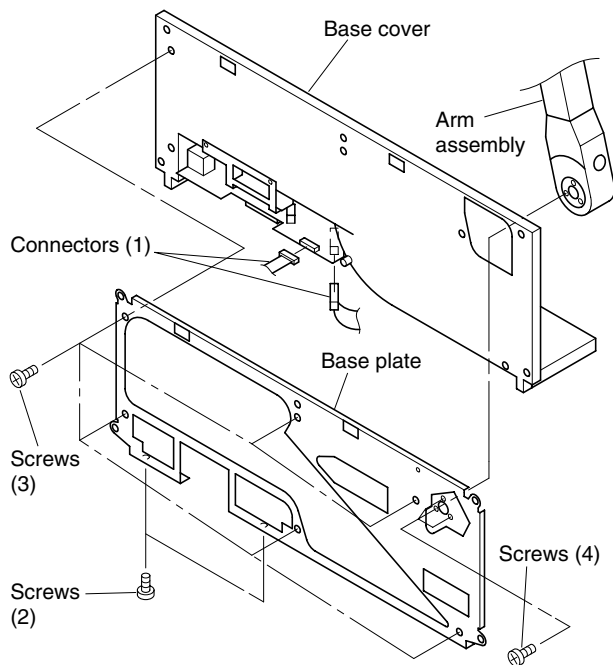
1. Remove FL lamp cover and FL lamp unit.
2. Remove 2 screws (1) and FL lamp.
3. Remove 4 screws (2) and remove lower FL lamp cover.



**Fig. 3-3-4**

### 3-3-4. Arm Assembly

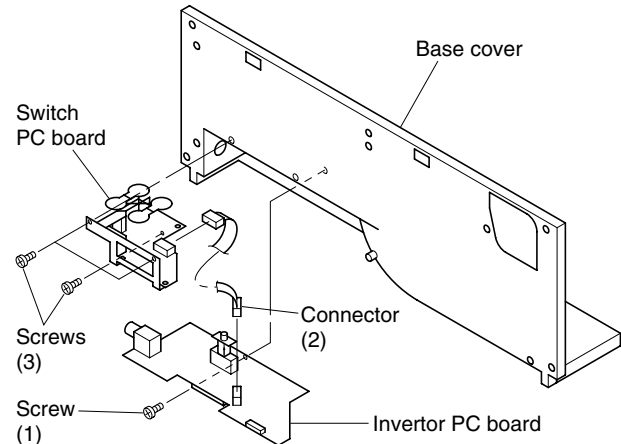
1. Remove document camera. (Refer to Fig. 3-1-1.)
2. Remove 2 connectors (1).
3. Remove 2 screws (2) securing inverter PC board.
4. Remove 6 screws (3) securing base cover and 3 screws (4) securing arm assembly, remove base plate, and arm assembly.



**Fig. 3-3-5**

### 3-3-5. Switch PC Board and Inverter PC Board

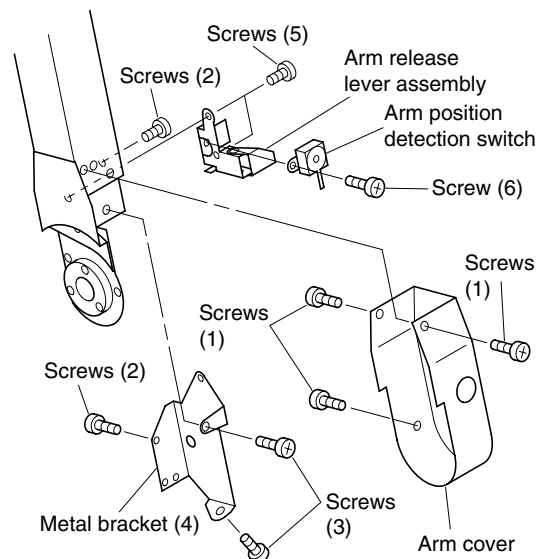
1. Remove document camera. (Refer to Fig. 3-1-1.)
2. Remove arm assembly. (Refer to Fig. 3-3-5.)
3. Remove 1 screw (1) and pull out inverter PC board from base cover. Remove 1 connector (2) and remove inverter PC board.
4. Remove 3 screws (3) and remove switch PC board.



**Fig. 3-3-6**

### 3-3-6. Arm Position Detection Switch

1. Remove document camera. (Refer to Fig. 3-1-1.)
2. Remove arm assembly. (Refer to Fig. 3-3-5.)
3. Remove 3 screws (1) and remove arm cover.
4. Remove 2 screws (2) and 2 screws (3), and remove metal bracket (4).
5. Remove 2 screws (5) and remove arm release lever assembly.
6. Remove 1 screw (6) and remove arm position detection switch.



**Fig. 3-3-7**

## 4. ELECTRICAL ADJUSTMENT

### < Test Equipments and Test Jigs >

- Oscilloscope
- Digital voltmeter
- Adjustment software TLP511.EXE

### < Input Signal List (for use of ROM:TLP511.EXE) >

- RGB signals (pedestal level)
- RGB signals (gray scale)
- RGB signals (50% APL)
- Video signal (gray scale)
- Common voltage adjustment signal (XGA)

### < Connection and Setting of Personal Computer >

#### (1) Connection of personal computer

- 1) Connect a computer as shown in Fig. 4-0-1, and then perform the adjustment using the adjustment software TLP511.EXE. (When using a drive C, type C: ¥TLP511.EXE and press enter key.)

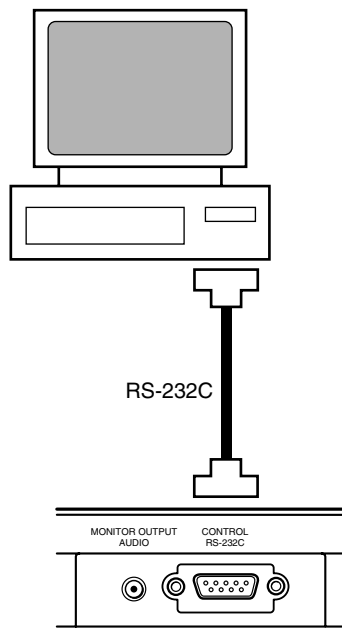


Fig. 4-0-1

#### (2) Default status setting

- 1) Connect computer and boot adjustment software.
- 2) Set contrast & brightness at the default.  
(Refer to owner's manual)

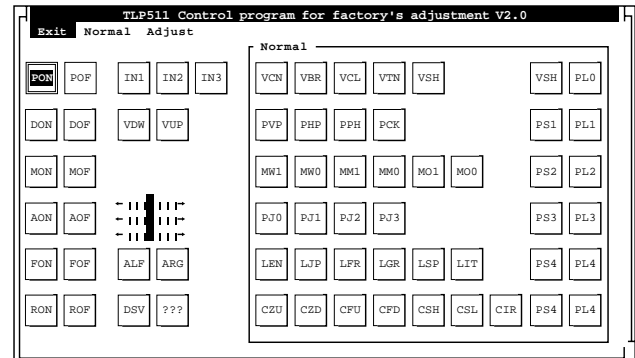


Fig. 4-0-2 Display of computer monitor  
(Normal menu)

#### (3) Adjustment method

- 1) Adjustment is carried out by using Adjust menu on the computer monitor.

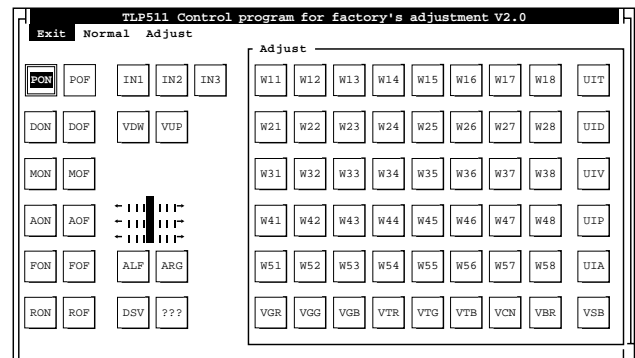


Fig. 4-0-3 Display of computer monitor (Adjust menu)

- 2) ☐ stands for an Adjust menu key.  
After clicked ☐ shown in adjustment items, click ☐ ALF, ☐ ARG alternately to adjust to a specified value.
- 3) Before proceeding to each adjustment click in ☐ IN1 Adjust menu to set RGB input. When making "1-3. Video signal input adjustment" click ☐ IN2 to set video input.

## < Adjustment Locations and Adjustment Items >

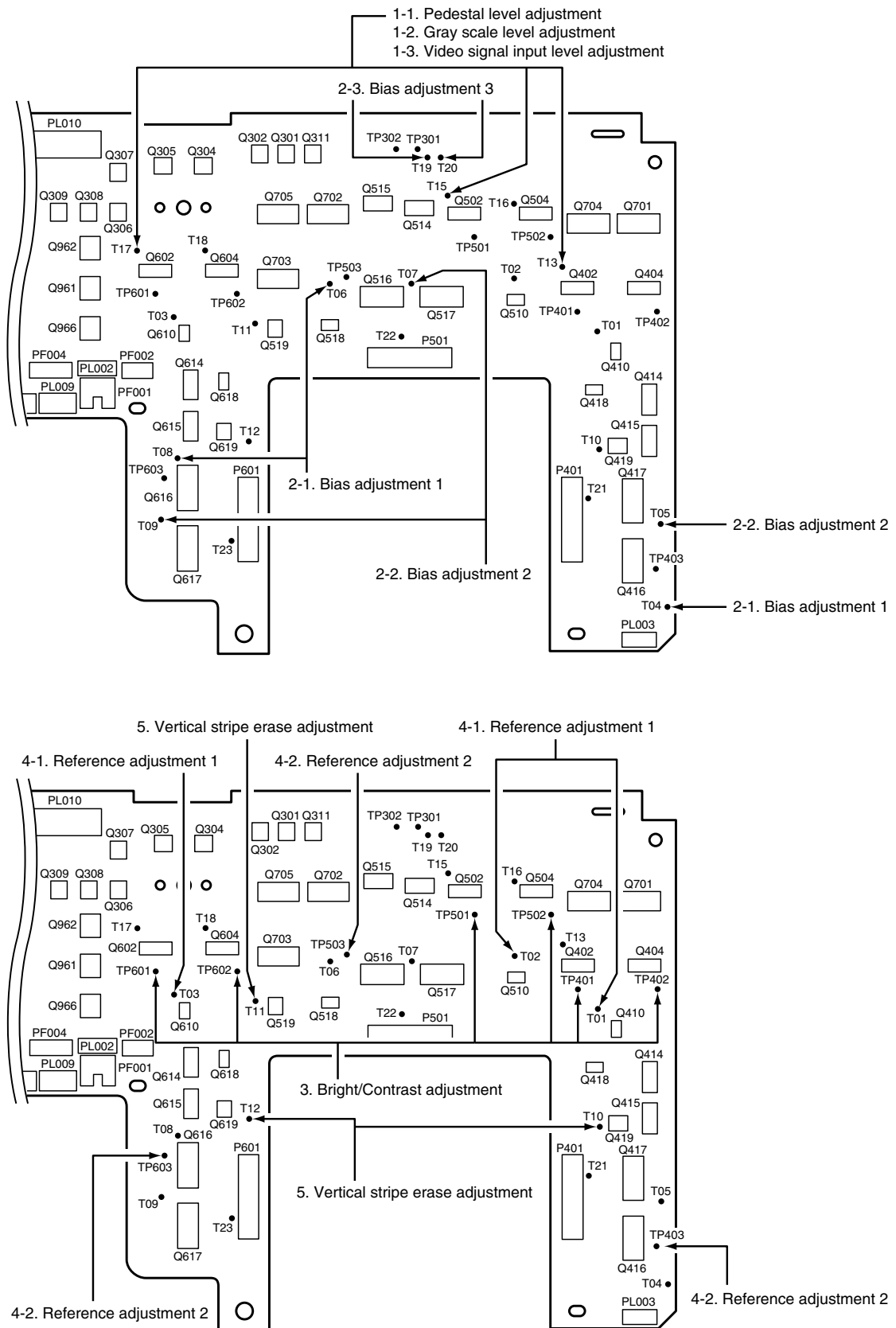




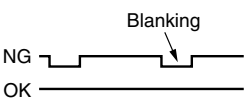



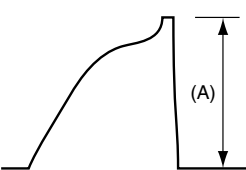




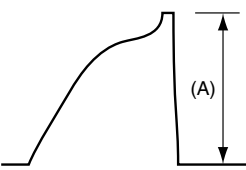






















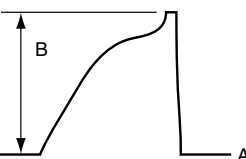
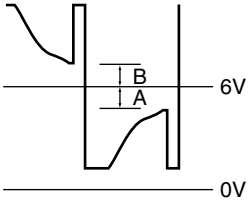
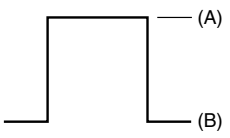


Fig. 4-0-4 Drive PC board (Top side)

Table 4-1-1

Adjust Items	Input Signal	Test Equipment	Test Point	Adjust Key	Adjust Value	Note
<b>1. Input level adjustment</b> 1-1. Pedestal level adjustment	RGB signals (pedestal level)	Oscilloscope	T13 (R) T15 (G) T17 (B)	  	• See the illustration right.	• Select  and adjust until signal shows flat. 
1-2. Gray scale level adjustment	RGB signals (gray scale)	Oscilloscope	T13 (R) T15 (G) T17 (B)	  	A = 1.75V ± 50 mV A = 1.75V ± 50 mV A = 1.75V ± 50 mV	
1-3. Video signal input level adjustment	Video signal (gray scale)	Oscilloscope	T13 (R) T15 (G) T17 (B)	  	A = 1.75V ± 50 mV A = 1.6V ± 50 mV A = 1.75V ± 50 mV	• Click  to set video input mode. 
<b>2. Bias adjustment</b> 2-1. Bias adjustment 1	RGB signals (gray scale)	Digital voltmeter	T04 (R) T06 (G) T08 (B)	  	6V ± 20 mV 6V ± 20 mV 6V ± 20 mV	
2-2. Bias adjustment 2	RGB signals (gray scale)	Digital voltmeter	T05 (R) T07 (G) T09 (B)	  	6V ± 20 mV 6V ± 20 mV 6V ± 20 mV	• Adjustment value for bias adjustment 1: ± 10 mV
2-3. Bias adjustment 3	RGB signals (gray scale)	Digital voltmeter	T20 (G) T19 (G)	 	6V ± 20 mV 6V ± 20 mV	• Click  on Normal menu to set forward scan mode and then start the adjustment. Next click  to set reverse scan mode and perform adjustment. • Adjustment value for bias adjustment 1: ± 10 mV
<b>3. Bright/Contrast adjustment</b>	RGB signals (gray scale)	Oscilloscope	TP401 (R) TP401 (R) TP402 (R)  TP402 (R)  TP501 (G) TP501 (G) TP502 (G)  TP502 (G)  TP601 (B) TP601 (B) TP602 (B)  TP602 (B)	 (bright)  (contrast)  (bright)   (contrast)   (bright)  (contrast)  (bright)   (contrast)   (bright)  (contrast)  (contrast)   (bright)	A = 2V ± 50 mV B = 3V ± 50 mV TP401 adjustment value ± 30 mV TP401 adjustment value ± 30 mV A = 2V ± 50 mV B = 2.9V ± 50 mV TP501 adjustment value ± 30 mV TP501 adjustment value ± 30 mV A = 2V ± 50 mV B = 2.9V ± 50 mV TP601 adjustment value ± 30 mV TP601 adjustment value ± 30 mV A = 2V ± 50 mV B = 2.9V ± 50 mV TP601 adjustment value ± 30 mV TP601 adjustment value ± 30 mV	



Adjust Items	Input Signal	Test Equipment	Test Point	Adjust Key	Adjust Value	Note
<b>4. Reference adjustment</b>						
4-1. Reference adjustment 1	RGB signals (gray scale)	Digital voltmeter	T01 (R) T02 (G) T03 (B)	W18 W28 W38	6V (coarse adjustment) 6V (coarse adjustment) 6V (coarse adjustment)	
4-2. Reference adjustment 2	RGB signals (gray scale)	Oscilloscope	TP403 (R) TP403 (R) TP503 (G) TP503 (G) TP603 (B) TP603 (B)	W17 W18 W27 W28 W37 W38	A B A B A B	<ul style="list-style-type: none"> <li>Adjust for A = B as shown in illustration belows. (tolerance <math>\pm 20</math> mV)</li> </ul> 
<b>5. Vertical stripe erase adjustment</b>	RGB signals (gray scale)	Oscilloscope	T10 (R) T10 (R) T11 (G) T11 (G) T12 (B) T12 (B)	W46 W44 W45 W48 W51 W47	A = $6.5V \pm 50$ mV B = $1.5V \pm 50$ mV A = $5.5V \pm 50$ mV B = $1.5V \pm 50$ mV A = $6.5V \pm 50$ mV B = $1.5V \pm 50$ mV	
<b>6. Bias adjustment</b>	RGB signals (50% APL)	—	—	W52	Less apparent for vertical stripe	<ul style="list-style-type: none"> <li>Click [BJD] on Normal menu and set forward scan mode on, and then make adjustment.</li> </ul>
<b>7. Common voltage adjustment</b>	Common voltage adjustment signal (XGA)	—	—	W41 W42 W43	Minimum flicker	<ul style="list-style-type: none"> <li>In ceiling installation: Set V reverse mode on (refer to owner's manual) and then make adjustment in the sameway.</li> </ul>

## 4-1. Camera Section Adjustment (TLP511U/E)

### < Before Adjustment >

In the most cases, this adjustment will be made after replacement of electrical parts. If a failure occurs in the electrical circuit, always locate the failure by using required instruments, and perform the repairing, replacement and the adjustment. Do not tamper the adjustment volumes without locating the failure. Some failure may not need readjustment, so only perform the adjustments required in practical servicing.

### < Equipment Required >

1. Personal computer  
IBM PC/AT or equivalent (with Windows 95 supported)
2. Color video monitor
3. Illumination  
Halogen lamp (500W x 2)
4. Toshiba camera adjustment chart  
Color bar chart (PN70909322)
5. Waveform monitor
6. Vector scope
7. Adjustment screwdriver
8. Color temperature conversion filter (C14)
9. Adjustment cable (PN70909447)
10. RS-232C cable (straight type)
11. Adjustment software

### Note:

- If illumination unevenness exists on the adjustment chart, correct adjustment can not be made. So arrange the illumination equipments to obtain the flat illumination.
- Always use the adjustment chart free from dirty.
- The unit employs PAL system. So use the above equipments for PAL system.

### < Initial Setting >

1. The adjustments for the camera section are carried out with the camera section removed from the unit.

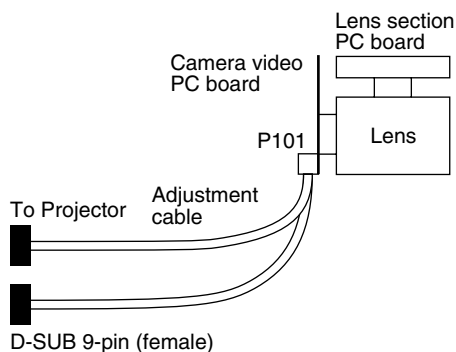


Fig. 4-1-1

2. Set the chart facing to the camera and adjust the light position to obtain the even light of the illumination.

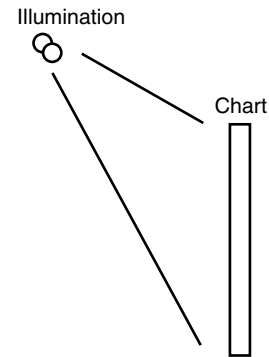


Fig. 4-1-2

3. Connect the connector (PM002) on the projector and P101 with the adjustment cable, and connect the camera output jack to the video monitor.
4. Connect the D-SUB9 pin connector of adjustment cable and COM1 port of the personal computer with a RS-232C cable.

### Note:

- After completion of the setting above, turn on the powers of all the equipments and leave then for 5 minute for warming up.

### < Cable Connection Diagram for Adjustment >

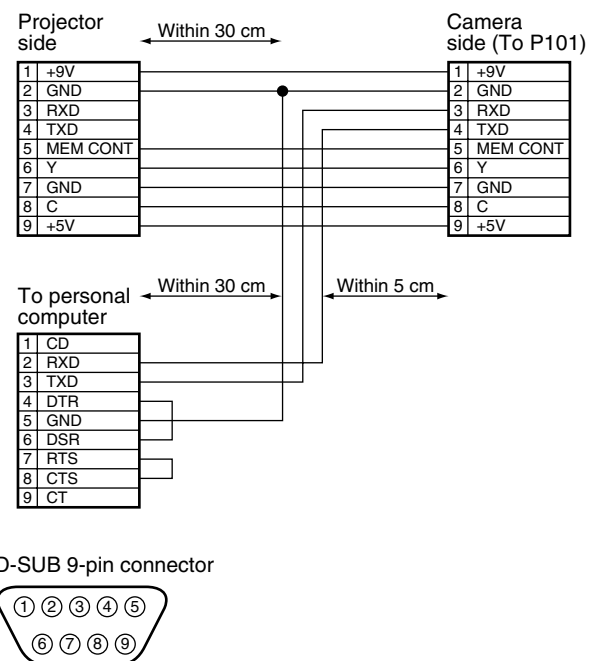


Fig. 4-1-3

## < Service Adjustment Software Boot Up >

1. Start the personal computer.
2. Check the camera power is on.
3. Boot up the adjustment software (K48ADJ).
4. Check a screen menu obtained on the computer monitor.
5. Each adjustment is carried out using the adjustment software.

The words with rectangle  in the sentence show the buttons on the display of a personal computer.

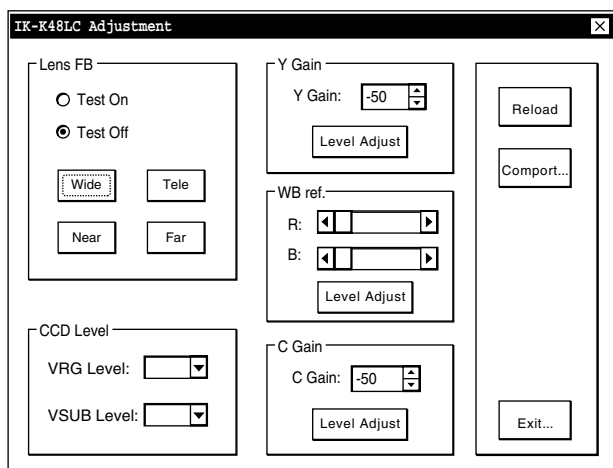


Fig. 4-1-4

### Note:

If an error message will appear, check following items.

- Camera power is on.
- Camera and personal computer (COM1 port) is connected.

## < Flow Chart >

The procedures are given in order to perform entire adjustments. Accordingly, some items may not be required depending on a type of failure or adjustment. In such a case, perform only the required items. However, always perform the initial setting.

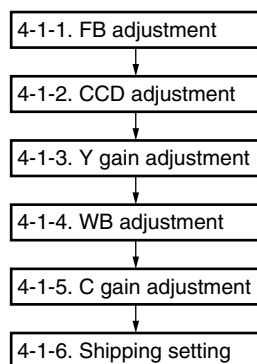


Fig. 4-1-5

## < Adjustment Locations and Adjustment Items >

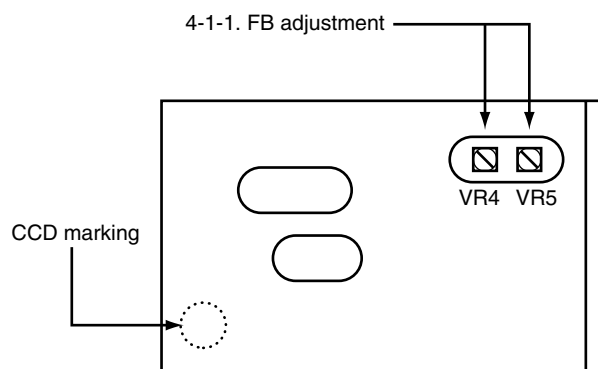


Fig. 4-1-6 Lens section PC Board (Top side)

### 4-1-1. FB Adjustment

#### Note:

This adjustment should be made only when the lens is replaced or removed from the camera PC board.

- Test point : Video output
- Test equipment : TV monitor, waveform monitor
- Adjusting point : VR4, VR5 (Lens section PC board)
- Adjusting value : Refer to below

1. Click Test On button. In this case, check the lens is set to the Tele side fully.
2. Shoot an object in distance of more than 10m and adjust the focus with VR5 on the lens section PCB.
3. Click Test Off button, shoot the object in distance of more than 10m, press Wide button until the lens reaches the wide end, and adjust the focus with VR4.
4. Shoot the color bar chart in distance of  $30 \pm 1$  cm, move the lens to the Tele end with the Tele button, and adjust the focus with the Near button/ Far button.
5. Keep to press Wide button to set the lens to the Wide end and check the focus is not deviated. If the focus is deviated, perform the adjustment from step 2 again.



#### 4-1-2. CCD Adjustment

##### Note:

This adjustment should be made only when the CCD is replaced. Before replacing the CCD, fill in the CCD back side marking on the specified location of the Lens PCB.

- Test point : —
  - Test equipment : —
  - Adjusting point : —
  - Adjusting value : Refer to below.
1. Select the specified marking (figure) of CCD on the VRG selection box on the CCD Level group of the adjustment software and click it.
  2. In the same way select the specified marking (alphabet) of CCD on the VSUB selection box and click.

#### 4-1-3. Y Gain Adjustment

- Test point : Video output
  - Test equipment : TV monitor, waveform monitor
  - Adjusting point : —
  - Adjusting value :  $80 \pm 20\%$
1. Shoot the color bar chart in full size of the screen. In this case, check the white section fully occupies the left side on the screen.
  2. Insert the color temperature conversion filter C14.
  3. Click the **Level Adjust** button on the Y Gain group, and check the luminance level of the white section is automatically set to  $80 \pm 20\%$ . If not, move the chart position so that the white section is located at left side of the screen and then click the **Level Adjust** button again.
  4. While observing the waveform monitor, adjust Y Gain   buttons until the white level shows  $80 \pm 10\%$ .

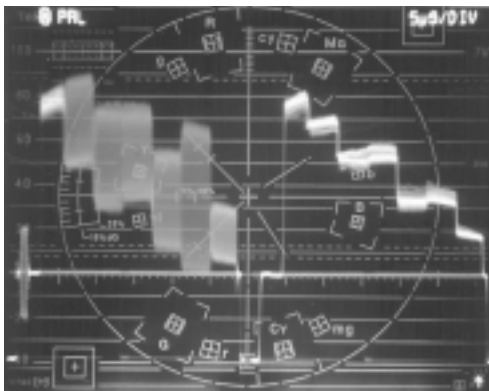


Fig. 4-1-7

#### 4-1-4. WB Adjustment

- Test point : Video output
  - Test equipment : TV monitor, vector scope, waveform monitor
  - Adjusting point : —
  - Adjusting value : Refer to below.
1. Shoot the color bar chart in full size of the screen. In this case, make sure the white section fully occupies the left side on the screen.
  2. Insert the color temperature conversion filter C14.
  3. Click the **Level Adjust** button on the WB ref. group, and check the luminance level of the white section is automatically set to  $80 \pm 10\%$ . If not, move the chart position so that the white section is located at left side of the screen and then click the **Level Adjust** button again.
  4. While observing the vector scope, adjust R/B scroll bar until the white section is located at vector center.

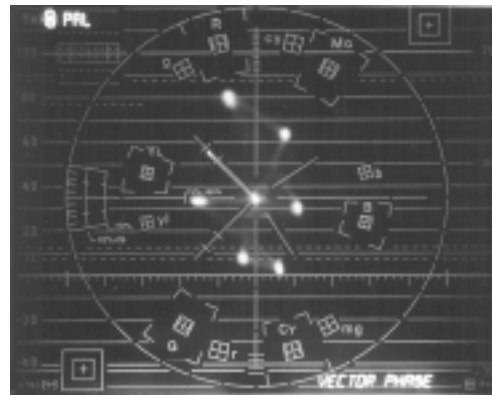
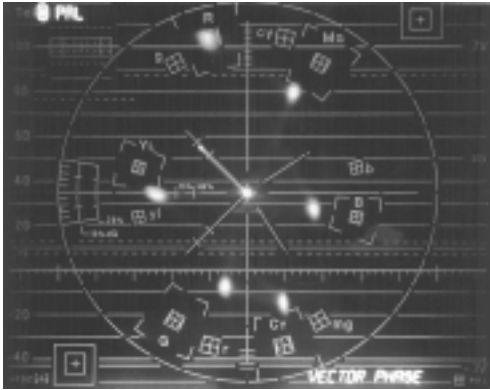


Fig. 4-1-8

#### 4-1-5. C Gain Adjustment

- Test point : Video output
  - Test equipment : TV monitor, vector scope, waveform monitor
  - Adjusting point : —
  - Adjusting value : Refer to below.
1. Shoot the color bar chart in full size of the screen. In this case, make sure the white section fully occupies the left side on the screen.
  2. Insert the color temperature conversion filter C14.

3. Click the **Level Adjust** button on the C gain group, and check the luminance level of the white section is automatically set to  $100 \pm 10\%$ . If not, move the chart position so that the white section is located at left side of the screen and then click the **Level Adjust** button again.
4. While observing the vector scope, adjust C Gain **▲** **▼** buttons until the R spot is located at center of **□**.



**Fig. 4-1-9**

#### 4-1-6. Camera Shipping Adjustment

- Test point : —
  - Test equipment : —
  - Adjusting point : —
  - Adjusting value : —
1. Click the **Exit...** button, and a dialogue box will appear on the screen. This completes the camera shipping adjustments.



**Fig. 4-1-10**

#### Note:

If an error message will appear, check following items.

- Camera power is on.
- Camera and personal computer (COM1 port) are connected.

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## 1-1. Replacing Subminiature "CHIP" Parts

### 1-1-1. Required Tools:

1. Fine tipped, well insulated soldering "pencil", about 30 Watts.
2. Tweezers.
3. Blower type hair dryer.

### 1-1-2. Soldering Cautions:

1. Do not apply heat for more than 3s.
2. Avoid using a rubbing stroke when soldering.
3. Discard removed chips; do no reuse them.
4. Supplementary cementing is not required.
5. Use care not to scratch or otherwise damage the chips.

### 1-1-3. Removal (Resistors, Capacitors, etc.):

1. Melt the solder at one side.

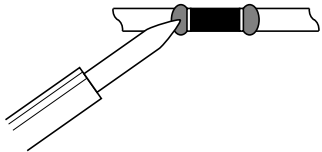


Fig. 1-1-1

2. Grasp the part with tweezers and melt the solder at the other side.

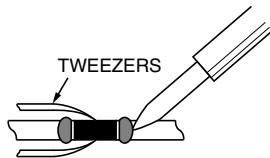


Fig. 1-1-2

3. Remove the part with a twisting motion.

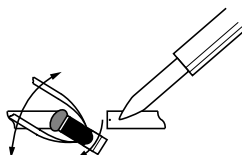


Fig. 1-1-3

### 1-1-4. Removal (Transistors, Diodes, etc.):

1. Melt the solder of one lead.

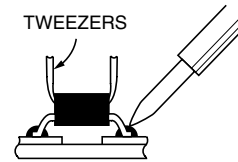


Fig. 1-1-4

2. Lift the side of that lead upward.

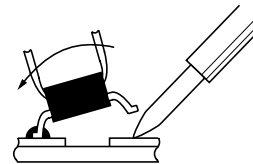


Fig. 1-1-5

3. Simultaneously heat solder the two remaining leads and lift part to remove.

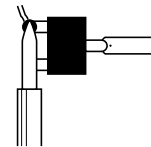


Fig. 1-1-6

### 1-1-5. Preheating (Except for semiconductors):

Immediately before installing new resistors or capacitors, use a blower type hair dryer and preheat the part for about two min. at approximately 150°C.

### 1-1-6. Replacement:

1. Presolder the contact points of the circuit pattern.

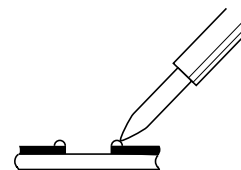


Fig. 1-1-7

2. Press the part downward with tweezers and apply the soldering pencil as indicated in the figure.

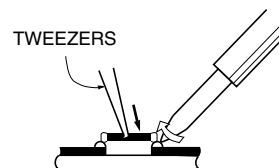


Fig. 1-1-8

## 1-2. Precautions for Part Replacement

- In the schematic diagram, parts marked  $\Delta$  (ex.  $\Delta$  F801) are critical part to meet the safety regulations, so always use the parts bearing specified part codes (SN) when replacing them.
- Using the parts other than those specified shall violate the regulations, and may cause troubles such as operation failures, fire etc.

## 1-3. Solid Resistor Indication

<b>Unit</b>	None ..... $\Omega$ k ..... $k\Omega$ M ..... $M\Omega$
<b>Tolerance</b>	None ..... $\pm 5\%$ B ..... $\pm 0.1\%$ C ..... $\pm 0.25\%$ D ..... $\pm 0.5\%$ F ..... $\pm 1\%$ G ..... $\pm 2\%$ K ..... $\pm 10\%$ M ..... $\pm 20\%$
<b>Rated Wattage</b>	(1) Chip Parts None ..... 1/16W (2) Other Parts None ..... 1/6W Other than above, described in the Circuit Diagram.
<b>Type</b>	None ..... Carbon film S ..... Solid R ..... Oxide metal film W ..... Metal film W ..... Cement FR ..... Fusible

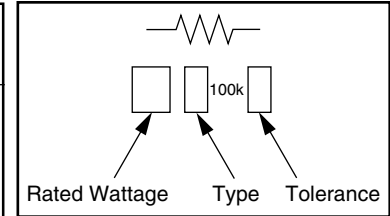


Fig. 1-3-1

## 1-4. Capacitance Indication

<b>Symbol</b>	$\text{—} \text{—} \text{—}^{\pm}$ ..... Electrolytic, Special electrolytic $\text{—} \text{—} \text{—}^{\text{NP}}$ ..... Non polarity electrolytic $\text{—} \text{—} \text{—}$ ..... Ceramic, plastic $\text{—} \text{—} \text{—}^{\text{M}}$ ..... Film $\text{—} \text{—} \text{—}^{\text{A}}$ ..... Trimmer
<b>Unit</b>	None ..... F $\mu$ ..... $\mu\text{F}$ p ..... pF
<b>Rated voltage</b>	None ..... 50V For other than 50V and electrolytic capacitors, described in the Circuit Diagram.
<b>Tolerance</b>	(1) Ceramic, plastic, and film capacitors of which capacitance are more than 10 pF. None ..... $\pm 5\%$ or more B ..... $\pm 0.1\%$ C ..... $\pm 0.25\%$ D ..... $\pm 0.5\%$ F ..... $\pm 1\%$ G ..... $\pm 2\%$ (2) Ceramic, plastic, and film capacitors of which capacitance are 10 pF or less. None ..... more than $\pm 5\%$ pF B ..... $\pm 0.1$ pF C ..... $\pm 0.25$ pF (3) Electrolytic, Trimmer Tolerance is not described.
<b>Temperature characteristic (Ceramic capacitor)</b>	None ..... SL For others, temperature characteristics are described. (For capacitors of 0.01 $\mu\text{F}$ and no indications are described as F.)

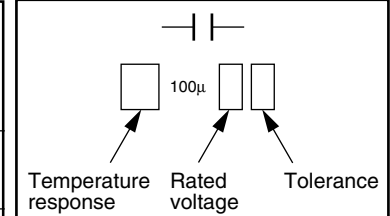
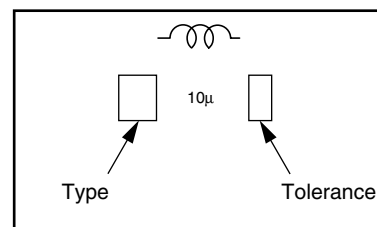


Fig. 1-4-1



## 1-5. Inductor Indication

<b>Unit</b>	None ..... H μ ..... μH m ..... mH
<b>Tolerance</b>	None ..... ±5% B ..... ±0.1% C ..... ±0.25% D ..... ±0.5% F ..... ±1% G ..... ±2% K ..... ±10% M ..... ±20%
<b>Type</b>	PL ..... Peaking For other, model name is described.

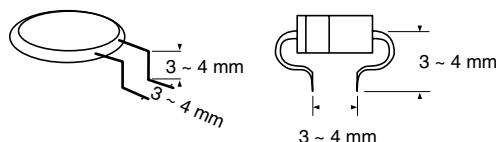


**Fig. 1-5-1**

## 1-6. Waveform and Voltage Measurement

- Measurement of waveform and voltage at each section in the color circuits was conducted with sufficient service color bar signal being received and reproduced in normal conditions.
- Waveforms and voltage values for the remaining circuit were measured with a broadcasting signal normally received, so they may vary slightly according to the programs being received. Use them as a measure for servicing.
- All voltage values except the waveforms are expressed in DC and measured by a digital voltmeter.

3. If it is difficult to remove the part, temporarily stop the desoldering job and wait until temperature of the part lowers.  
Then, repeat steps 1 and 2.
4. Form leads of the replacement part (general part equivalent to the chip part) as shown in the figures and solder place. (Fig. 1-7-2)

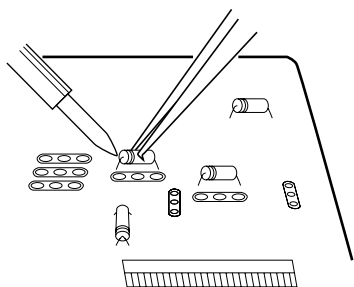


**Fig. 1-7-2**

## 1-7. Chip Part Replacement

(Use spare part with wire leads connected.)

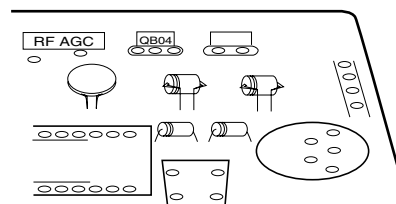
1. Hold a Chip part to be removed with tweezers and apply heat to the solder at one end of the part with a soldering iron. (Fig. 1-7-1)



**Fig. 1-7-1**

2. Apply heat to the solder at the other end of the part and remove it.  
  
The heating time should be as short as possible so the excessive heat is not applied to foil patterns and the PC Board.

5. Mount the replacement part so that it does not touch any other parts. (Fig. 1-7-3)



**Fig. 1-7-3**

2. PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM

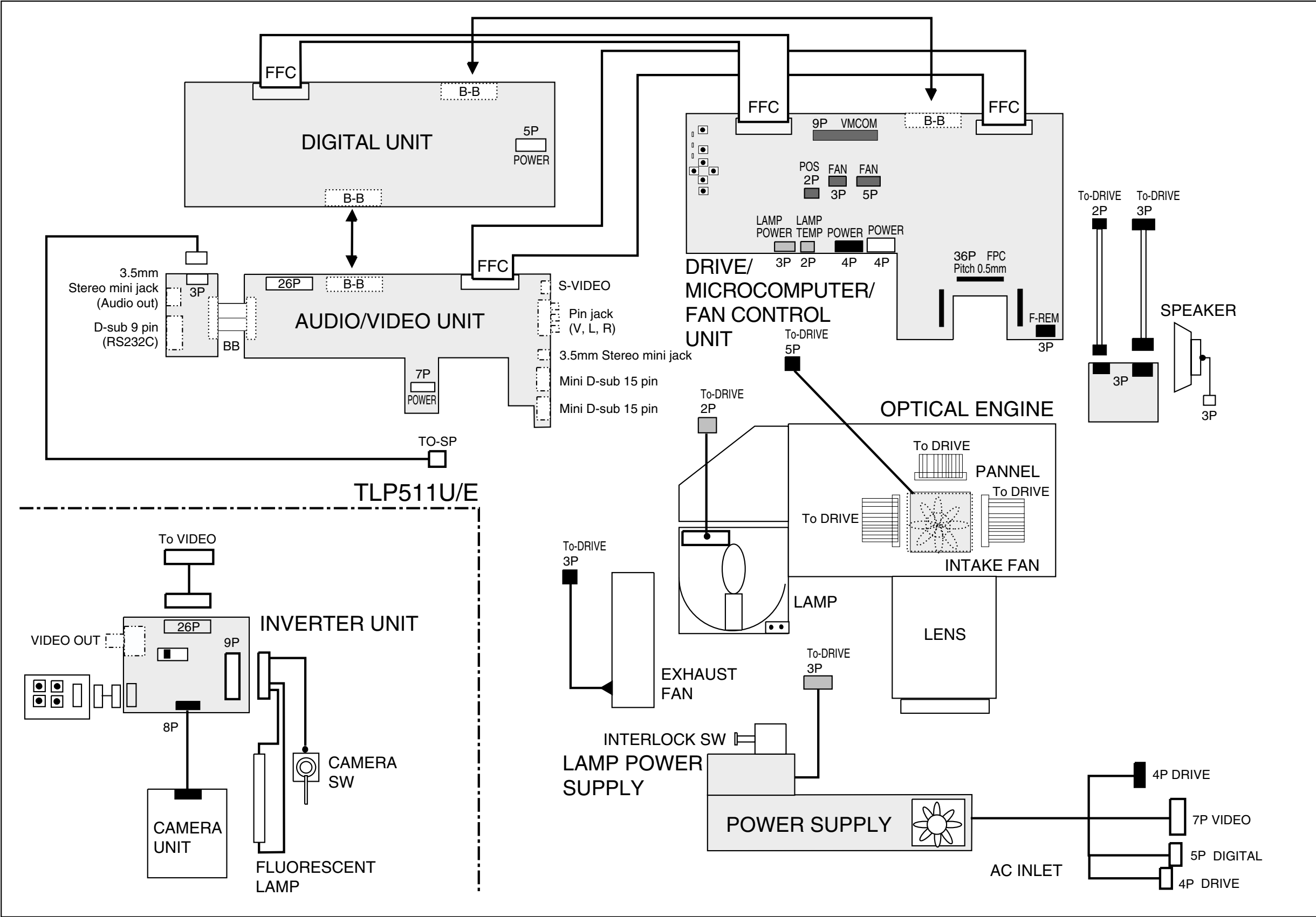


Fig. 2-0-1

# SECTION 3

## PARTS LIST

### SAFETY PRECAUTION

The parts identified by  $\triangle$  mark are critical for safety. Replace only with part number specified.

The mounting position of replacement is to be identical with originals.

The substitute replacement parts which do not have the same safety characteristics as specified in the parts list may create shock, fire or other hazards.

### NOTICE

The part number must be used when ordering parts in order to assist in processing, be sure to include the model number and description.

Parts marked # are of chip type and mounted on original PC boards.

However, when they are placed for servicing works, use discrete parts listed on the parts list.

### ABBREVIATIONS

#### 1. Integrated circuit (IC)

#### 2. Capacitor (Cap)

- Capacitance Tolerance (for Nominal Capacitance more than 10pF)

Table 2-0-1

Symbol	B	C	D	F	G	J	K	M	N
Tolerance %	$\pm 0.1$	$\pm 0.25$	$\pm 0.5$	$\pm 1$	$\pm 2$	$\pm 5$	$\pm 10$	$\pm 20$	$\pm 30$

Symbol	P	Q	T	U	V	W	X	Y	Z
Tolerance %	+ 100 0	+ 30 - 10	+ 50 - 10	+ 75 - 10	+ 20 - 10	+ 100 - 10	+ 40 - 20	+ 150 - 10	+ 80 - 20

Ex. 10 $\mu$ F J = 10 $\mu$ F  $\pm 5\%$

- Capacitance Tolerance (for Nominal Capacitance 10pF or less)

Table 2-0-2

Symbol	B	C	D	F	G
Tolerance pF	$\pm 0.1$	$\pm 0.25$	$\pm 0.5$	$\pm 1$	$\pm 2$

Ex. 10pF G = 10pF  $\pm 2$ pF

#### 3. Resistor (Res)

- Resistance tolerance

Table 3-0-1

Symbol	B	C	D	F	G	J	K	M
Tolerance %	$\pm 0.1$	$\pm 0.25$	$\pm 0.5$	$\pm 1$	$\pm 2$	$\pm 5$	$\pm 10$	$\pm 20$

Ex. 470  $\Omega$  J = 470 $\Omega$   $\pm 5\%$

## 4. EXPLODED VIEWS

### 4-1. Packing Assembly

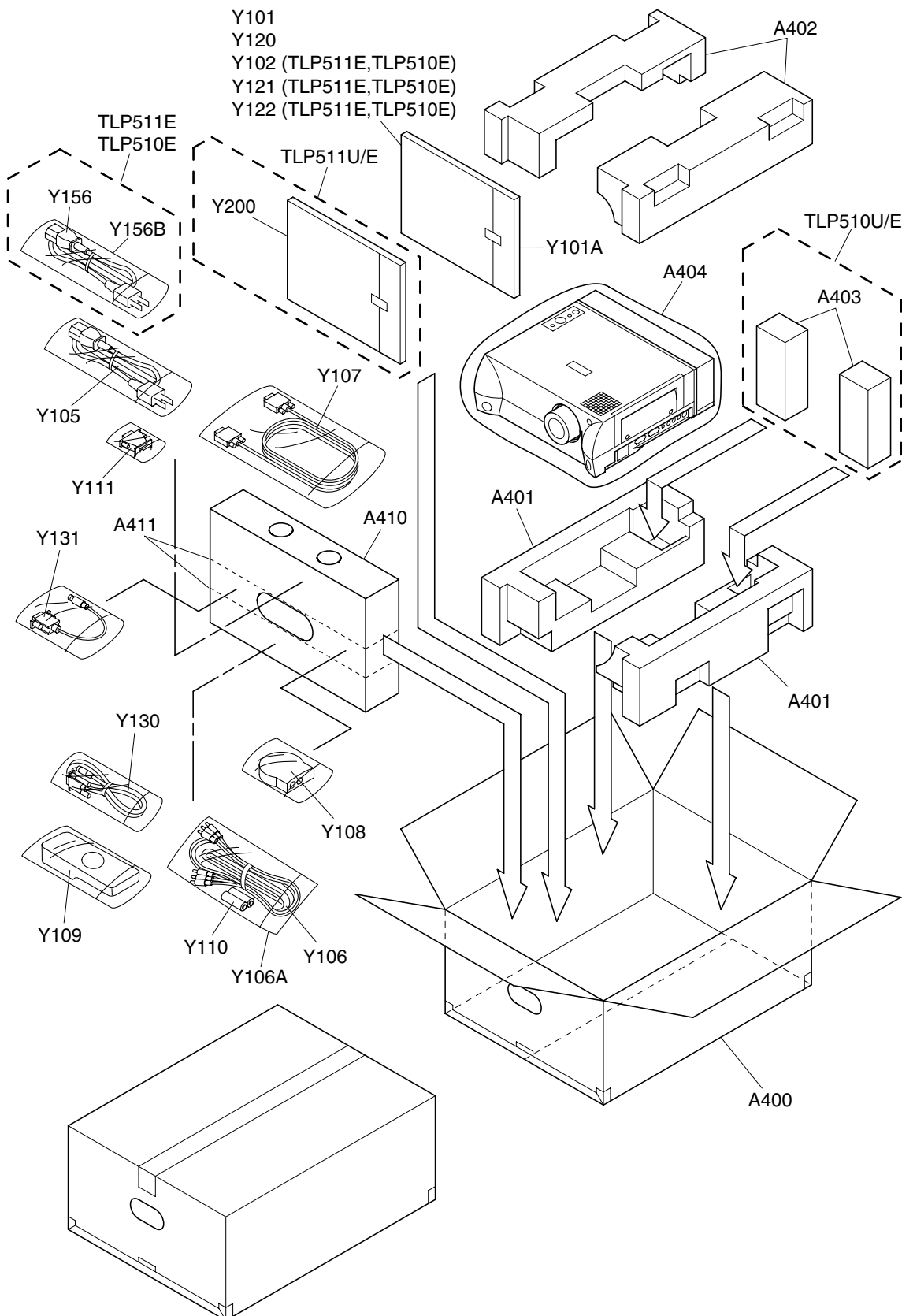


Fig. 4-1-1

4-2. Remote Control Unit

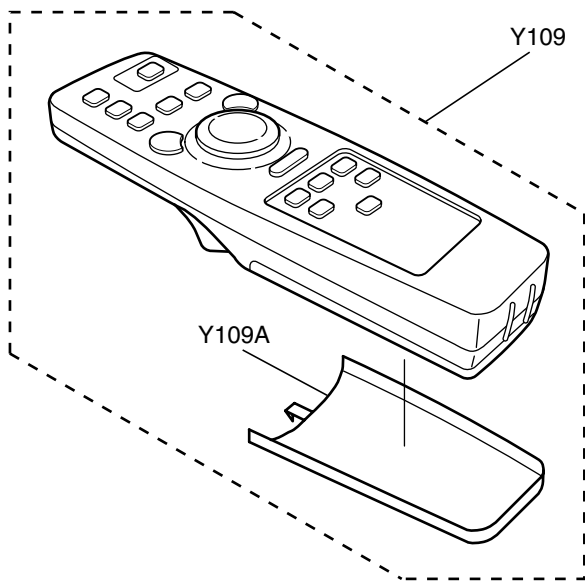


Fig. 4-2-1

4-3. Label Position

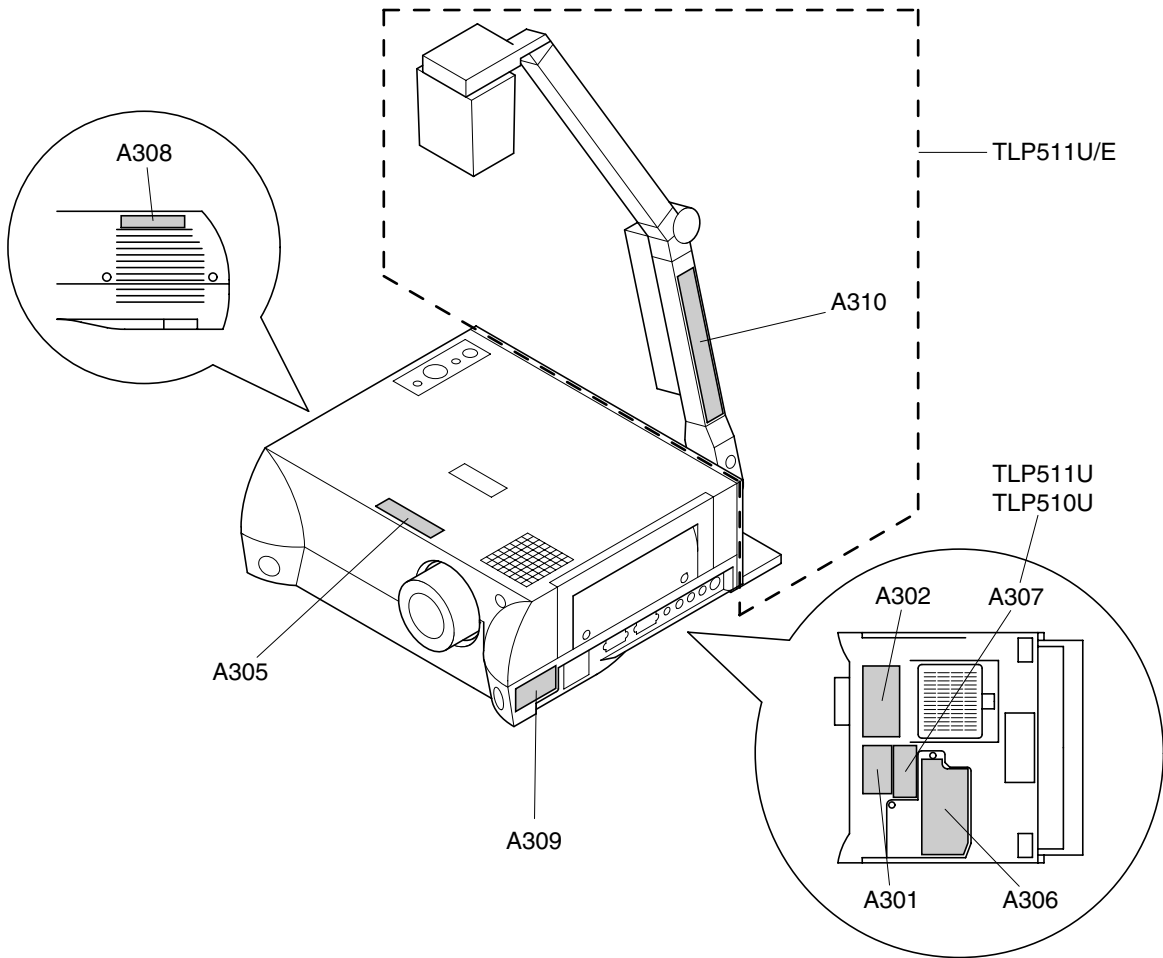


Fig. 4-3-1

[illegible]

**3-4**

## 4-5. Optical Box Assembly

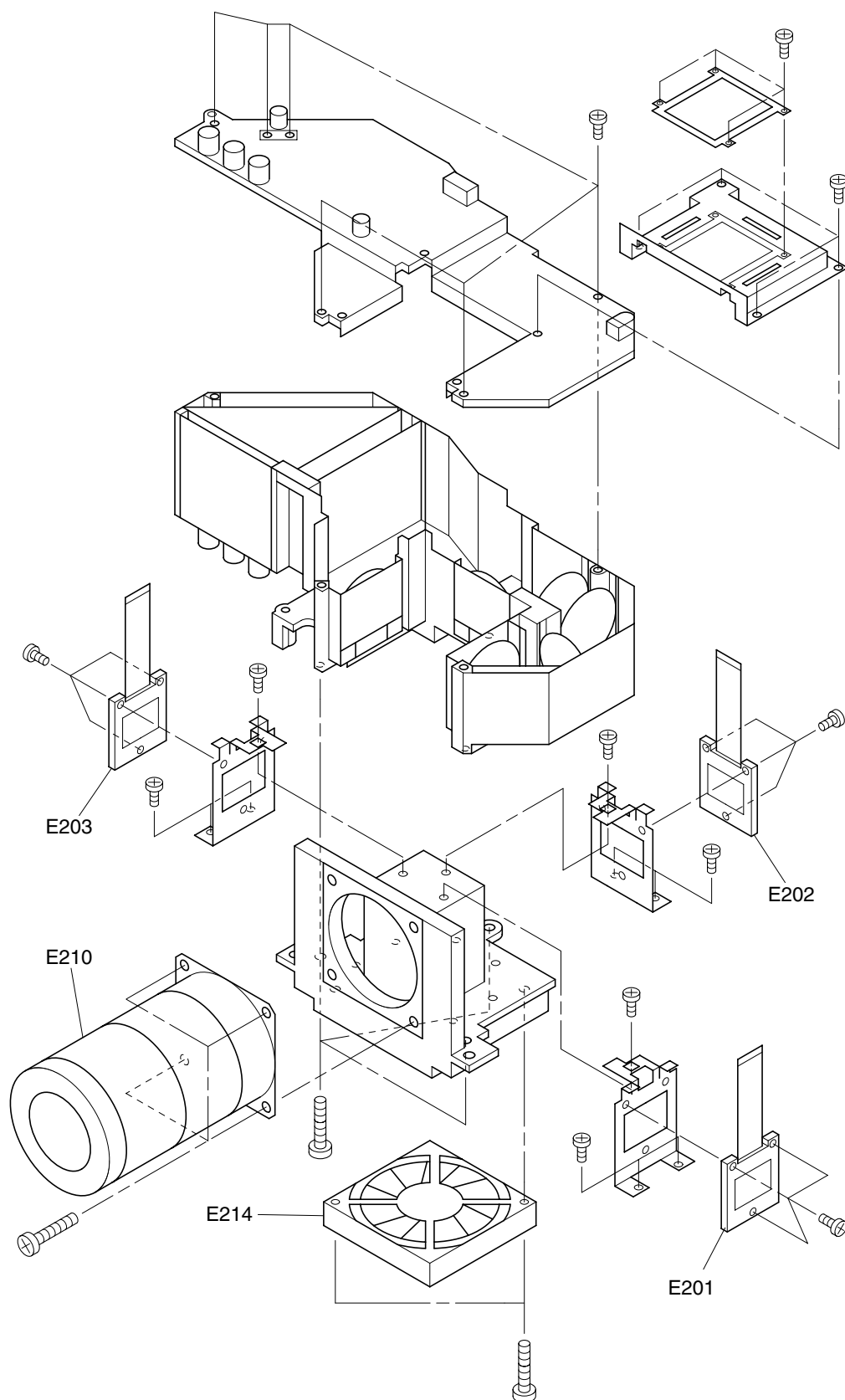
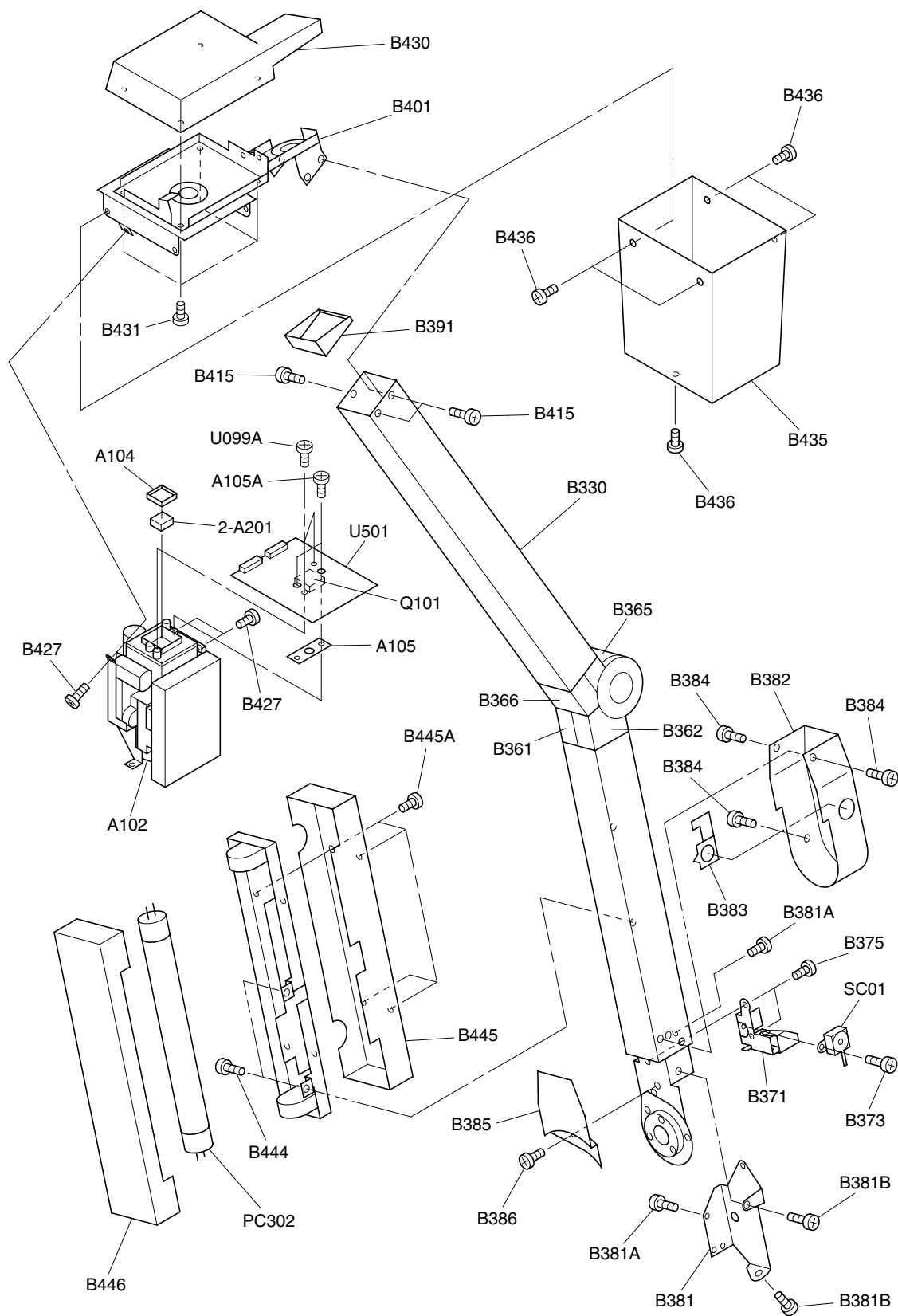


Fig. 4-5-1

## 4-6. Arm Assembly



**Fig. 4-6-1**



**TOSHIBA CORPORATION**  
1-1, SHIBAURA 1-CHOME, MINATO-KU, TOKYO 105-01, JAPAN